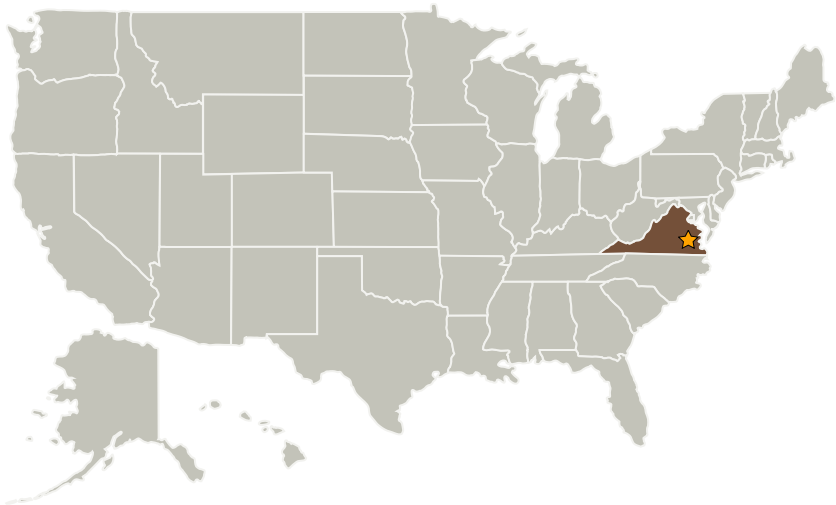
Multifunctional Polymers Incorporating High-Z Neutron-Capture Nanoparticles, Phase II

Completed Technology Project (2007 - 2009)

Project Introduction

NASA has identified the need to develop lightweight structures to support Lunar Lander and Lunar Habitat programs and for the transfer of relevant technology to the Crew Exploration Vehicle and Crew Launch Vehicle programs. Further, NASA called for revolutionary advances in radiation shielding materials to protect humans from radiation hazards during NASA missions. To address this need, International Scientific Technologies, Inc., in conjunction with the College of William and Mary, developed lightweight, multifunctional polymers incorporating nanoparticles consisting of high atomic-number (Z) elements having large neutron-capture cross sections. The Phase I program proved the effectiveness of these polymeric nanocomposites in shielding against both neutron and X-ray radiation. The feasibility demonstrated in Phase I will be realized in Phase II through a research program having four Technical Objectives, including incorporation of metallic nanoparticle and organometallic additives into polymeric materials, fabrication of various polymeric materials of different geometries, measurement and test of composite materials for radiation shielding effectiveness, as well as thermo-mechanical and electrical properties, and optimization of prototype multifunctional nanocomposites for NASA applications. The polymer nanocomposites in Phase II will provide shielding against galactic cosmic radiation, neutron and electromagnetic radiation in rigid and flexible structure habitants in deep space and lunar missions.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
International Scientific Technologies, Inc.	Supporting Organization	Industry	Dublin, Virginia

Primary U.S. Work Locations
Virginia

Project Transitions

November 2007: Project Start

November 2009: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.3 Thermal Protection Components and Systems
    - TX14.3.1 Thermal Protection Materials